SPA and Routing with React Router v5

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Where is The Code?

Angular Application Programming
code is available @GitHub:

https://github.com/iproduct/Course-Multimedia-FMI

Where is The Code?

React.js Web App code is available @GitHub:

https://github.com/iproduct/course-node-express-react

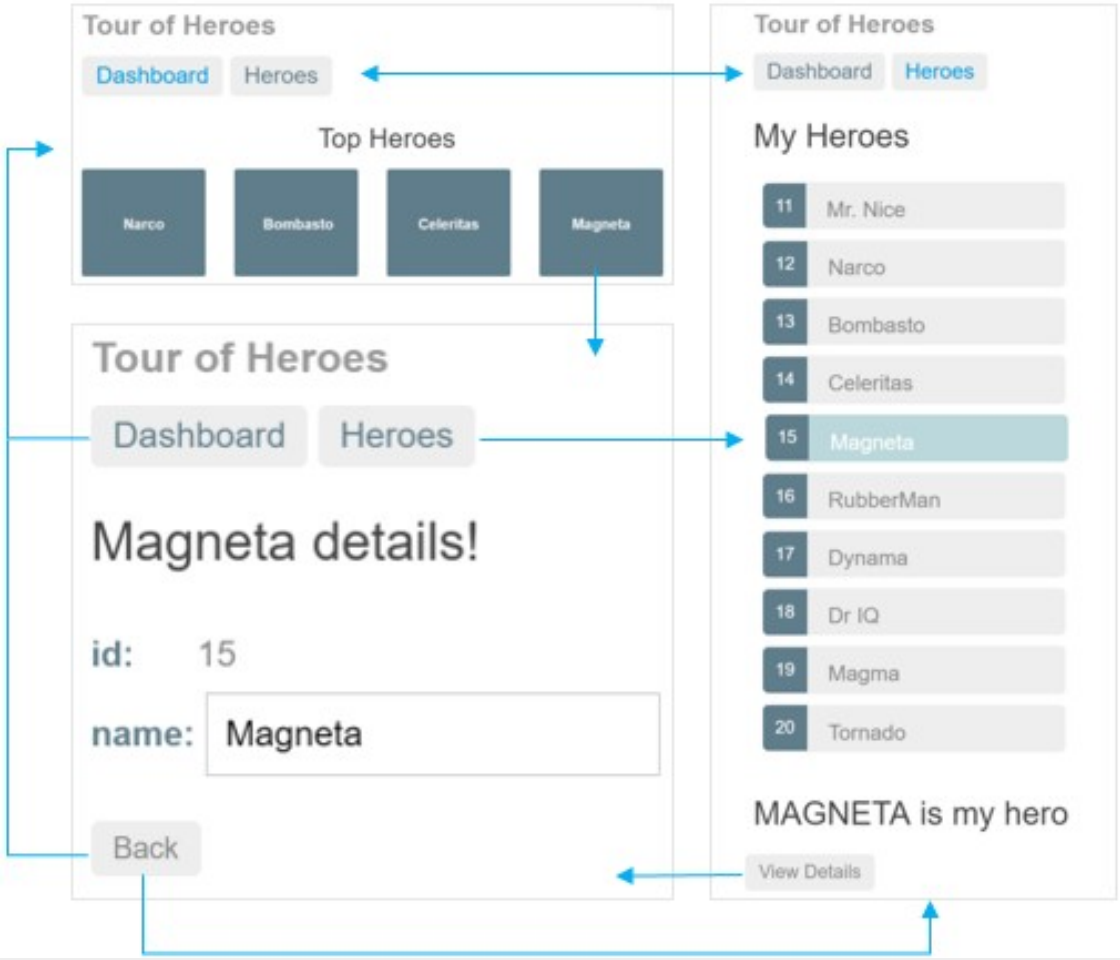
Demos:

- **14-ipt-knowledge-tester-express** – with React router v2
- **15-react-router-v4** – with React router v4
- **16-react-todos-redux** – basic Redux demo
- **17-react-todos-redux-es7-decorator** – demo using @connect ES7
- **18-react-router-redux** – React + Redux + Router + Thunk (async actions) integration

Contemporary Web Applications

- Provide better User Experience (UX) by:
  - more interactive
  - loading and reacting faster in response (or even anticipation) of user's moves
  - able to work offline
  - supporting multiple devices and screen resolutions (responsive design)
  - are following design metaphors consistently (e.g. Google Material Design - MD)
  - looking more like desktop application than static web page

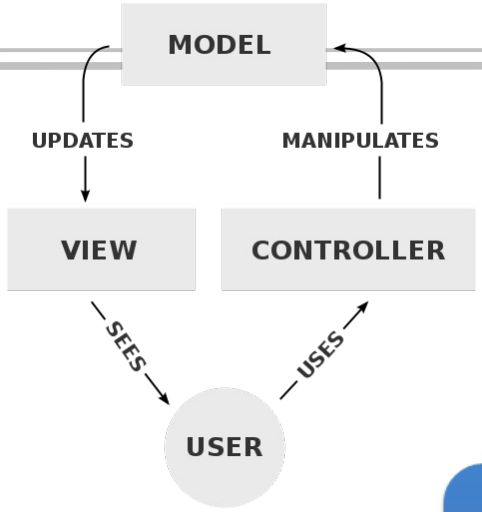
Single Page Applications (SPA)

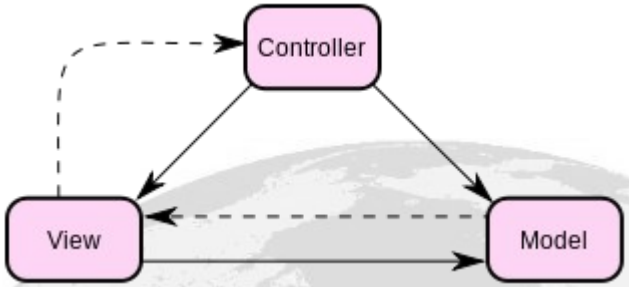


Source: Angular 2 Tutorial: Routing https://angular.io/docs/ts/latest/tutorial/toh-pt5.html

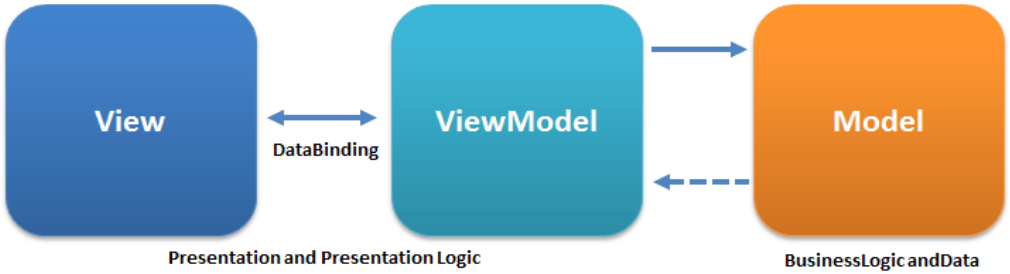
MVC Comes in Different Flavors

- MVC

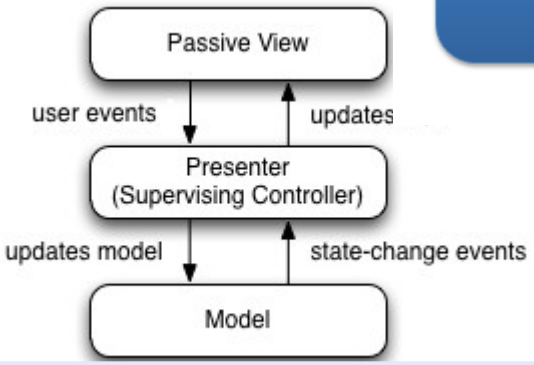




- MVVM



- MVP



Sources:https://en.wikipedia.org/wiki/Model_View_ViewModel#/media/File:MVVMPattern.png, https://en.wikipedia.org/wiki/Model%E2%80%93view%E2%80%93presenter#/media/File:Model_View_Presenter_GUI_Design_Pattern.png
License: CC BY-SA 3.0, Authors:Ugaya40, Daniel.Cardenas

Why SPA?

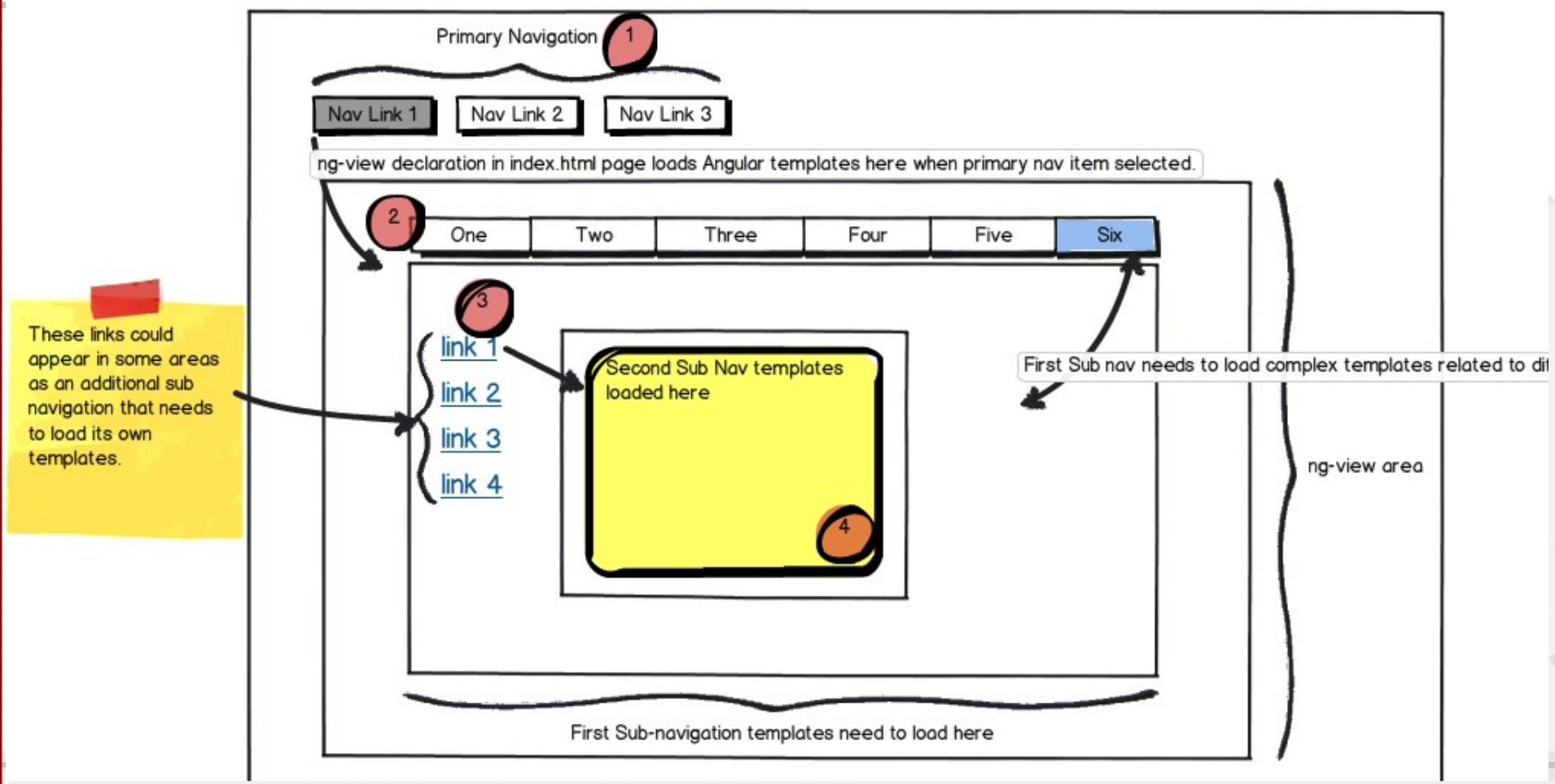
- Page does not flicker – seamless (or even animated) transitions
- Less data transferred – responses are cached
- Only raw data, not markup
- Features can be loaded on demand (lazy) or in background
- Most page processing happens on the client offloading the server: REST data services + snapshops for crawlers (SEO)
- Code reuse – REST endopints are general purpose
- Supporting multiple platforms (Web, iOS, Android) → React Native

Developing Sinagle Page Apps (SPA) in 3 steps

1) Setting up a build system – *npm, webpack, gulp* are common choices, *babel, typescript, JSX, CSS preprocessors (SASS, SCSS, LESS), jasmine, karma, protractor, live servers* ...
2) Designing front-end architecture components – *views & layouts* + *view models* (presentation data models) + *presentation logic* (event handling, messaging) + *routing paths* (essential for SPA)

   Better to use component model to boost productivity and maintainability.
3) End-to-end application design – front-end: wireframes → views, data entities & data streams → service API and models design, sitemap → router config

Hierarchical Routing



Source: http://stackoverflow.com/questions/12863663/complex-nesting-of-partials-and-templates
Author: PhillipKregg

SPA with Multiple Router Outlets

Root

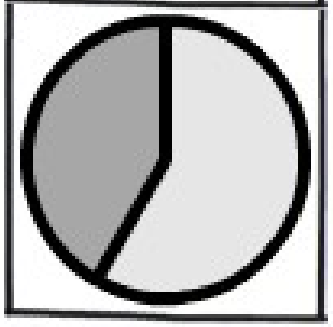
filters

Type: Employee Age Range 3 to 35 Date: 01/01/2013

tabledata

Name (job title)	Age	Nickname	Employee
Giacomo Guilizzoni Founder & CEO	34	Peldi	☑
Guido Jack Guilizzoni	4	The Guids	☐
Marco Botton Tuttofare	31		☑
Mariah Maclachlan Better Half	35	Patata	☑
Valerie Liberty COO, WOW! Division	:)	Val	☑

graph



Getting Started with React Router v5

- Create new project using *create-react-app*:

  npm install -g create-react-app

  create-react-app demo-app

  cd demo-app

- Install *react-router-dom*:

  npm install react-router-dom

- Implement routing in *src/App.js*

Basic Routing using React Router v5 (1)

```
import React from 'react';
import { BrowserRouter as Router, Switch, Route, Link } from "react-
router-dom";

export default function App() {
    return (
        <Router>
            <div>
                <nav>
                    <ul>
                        <li>
                            <Link to="/">Home</Link>
                        </li>
                        <li>
                            <Link to="/about">About</Link>
                        </li>
                        <li>
                            <Link to="/topics">Topics</Link>
                        </li>
                    </ul>
                </nav>
```

Basic Routing using React Router v5 (2)

```
                {/* A <Switch> looks through its children <Route>s and
            renders the first one that matches the current URL. */}
                <Switch>
                    <Route path="/about">
                        <About/>
                    </Route>
                    <Route path="/topics">
                        <Topics/>
                    </Route>
                    <Route exact path="/">
                        <Home/>
                    </Route>
                </Switch>
            </div>
        </Router>
    );
}

function Home()  { return <h2>Home</h2>;  }
function About() { return <h2>About</h2>; }
function Topics() { return <h2>Topics</h2>; }
```

Nested Routing & Params using Router v5 (3)

```
function Topics() {
    let match = useRouteMatch();

    return (
        <div>
            <h2>Topics</h2>

            <ul>
                <li>
                    <Link to={`${match.url}/components`}>Components
                    </Link>
                </li>
                <li>
                    <Link to={`${match.url}/props-v-state`}>
                        Props v. State
                    </Link>
                </li>
            </ul>

        (- continues -)
```

Nested Routing & Params using Router v5 (4)

```
            {/* The Topics page has its own <Switch> with more routes
          that build on the /topics URL path. You can think of the
          2nd <Route> here as an "index" page for all topics, or
          the page that is shown when no topic is selected */}
            <Switch>
                <Route path={`${match.path}/:topicId`}>
                    <Topic />
                </Route>
                <Route exact path={match.path}>
                    <h3>Please select a topic.</h3>
                </Route>
            </Switch>
        </div>
    );
}

function Topic() {
    let { topicId } = useParams();
    return <h3>Requested topic ID: {topicId}</h3>;
}
```

React Router Configuration

```
<Route path="/" component={Base} />
<Route path="/home" component={Home} />
<Route path="/intro"
       render={() => <div>How to start using this app</div>} />
<Route path="/repos" component={Repos} />
<Route path="/topics" component={Topics} />
<Route path="/about" component={About} />
<Route path="/show-location" component={ShowTheLocation} />
```

```
const Repos = (props) => {
    return (
      <div>
        <h2>Repos</h2>
        <Route path="/repos/:userName/:repoName" component={Repo} />
      </div>
    );
};
```

Hierarchical navigation,
no need to use props.children

Site Navigation using Router

```
<ul className="main-menu">
  <li><Link to="/home">Home</Link></li>
  <li><Link to="/intro">Intro</Link></li>
  <li><Link to="/repos">Repos</Link></li>
  <li><Link to="/topics">Topics</Link></li>
  <li><Link to="/show-location">Show the Location</Link></li>
  <li><Link to="/about">About</Link></li>
  <form className="navbar-form navbar-right" role="search"
        onSubmit={this.handleSerch}>
    <input type="text" placeholder="userName" /> / {' '}
    <input type="text" placeholder="repo" /> {' '}
    <button type="submit" className="btn
btn-default">Go</button>
  </form>
</ul>
```

Programmatic Navigation using Router

```
ReactDOM.render(
  <Router >
    <App />
  </Router>,
  document.getElementById('root')
);
```

```
handleSearch = (event) => {
    event.preventDefault();
    const userName = event.target.elements[0].value;
    const repo = event.target.elements[1].value;
    const path = `/repos/${userName}/${repo}`;
    console.log(path);
    console.log(this.context);
    // this.context.router.history.push(path);
    this.props.history.push(path);
  }
```

Using @withRouter Decorator (HOC)

```
import React from 'react';
import PropTypes from 'prop-types';
import { withRouter } from 'react-router-dom';

@withRouter
export default class ShowTheLocation extends React.Component {
  render() {
    const { match, location, history } = this.props;
    return (
      <div>
        <div>You are now at {location.pathname}</div>
        <div>The match is: {JSON.stringify(match)}</div>
        <div>The history contains: {JSON.stringify(history)}</div>
      </div>
    )
  }
}
```

Login Demo with Redirection

- There are 3 pages:
  - public page (demonstrating the public part of a web site)
  - protected page (demonstrating the private part of web site)
  - login page
- In order to see the protected page, you must login first. Upon login success, you will be redirected automatically to the required protected page.
- If you click the back button, would you expect to go back to the login page? No! You're already logged in. Going back, you should see the page you visited *before* logging in - the public page.

Login Demo with Redirection (1)

```
export default function AuthExample() {
  return (
      <Router>
          <div>
              <AuthButton />
              <ul>
                  <li><Link to="/public">Public Page</Link></li>
                  <li><Link to="/protected">Protected Page</Link></li>
              </ul>

              <Switch>
                  <Route path="/public"><PublicPage /></Route>
                  <Route path="/login"><LoginPage /></Route>
                  <PrivateRoute path="/protected">
                      <ProtectedPage />
                  </PrivateRoute>
              </Switch>
          </div>
      </Router>
  );
}
```

Login Demo with Redirection (2)

```
const fakeAuth = {
    isAuthenticated: false,
    authenticate(cb) {
        fakeAuth.isAuthenticated = true; setTimeout(cb, 100); },
    signout(cb) {
        fakeAuth.isAuthenticated = false; setTimeout(cb, 100);}
};

function AuthButton() {
    let history = useHistory();
    return fakeAuth.isAuthenticated ? (
        <p>Welcome!{" "}
            <button
                onClick={() => {
                    fakeAuth.signout(() => history.push("/"));
                }}
            >Sign out</button>
        </p>) : (<p>You are not logged in.</p>);
}
```

Login Demo with Redirection (3)

```
// A wrapper for <Route> that redirects to the login
// screen if you're not yet authenticated.

function PrivateRoute({ children, ...rest }) {
    return (
        <Route
            {...rest}
            render={({ location }) =>
                fakeAuth.isAuthenticated ? (
                    children
                ) : (
                    <Redirect to={{
                      pathname: "/login",
                      state: { from: location }
                    }}/>
                )
            }
        />
    );
}
```

Login Demo with Redirection (4)

```
function PublicPage() { return <h3>Public</h3>; }

function ProtectedPage() { return <h3>Protected</h3>; }

function LoginPage() {
    let history = useHistory();
    let location = useLocation();
    let { from } = location.state || { from: { pathname: "/" } };
    let login = () => {
        fakeAuth.authenticate(() => {
            history.replace(from);
        });
    };

    return (
        <div>
            <p>You must log in to view the page at {from.pathname}</p>
            <button onClick={login}>Log in</button>
        </div>
    );
}
```

Thanks for Your Attention!

Questions?